Running Head: EVALUATION OF THE HOME-GROWN CODER INITIATIVE

Evaluation of DeWitt Army Community Hospital's
Home-Grown Coder Initiative

A Graduate Management Project
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14. ABSTRACT
The purpose of this study was to evaluate the impact of the home-grown coder initiative on coding accuracy in DeWitt Army Community Hospitals Internal Medicine Clinic. The homegrown coder initiative is a training program designed to teach medical clerks how to code records. The study evaluated the accuracy of the home-grown coders after completion of the first phase of training, which consisted of six weeks of on-the-job training. Previous studies have appraised the difference in coding accuracy between providers and medical clerks, but no studies have been published evaluating the accuracy of medical clerks coding after completion of an on-the-job training program. Sixty patient encounters were included in the provider data set, and fifty-six patient encounters were included in the home-grown coder data set. The data sets were analyzed for variance from a standard established by a certified coder. Between data set variance was also tested for significance. The analysis used the following statistical tools: Wilcoxon Signed-Rank Test, Mann-Whitney Test, Chi Square, and Fishers Exact Probability Test. Results showed the home-grown coders to be more accurate in coding Evaluation and Management codes, diagnoses, and procedures. These results indicate that implementation of a home-grown coder initiative will result in improved medical record coding.

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Abstract

The purpose of this study was to evaluate the impact of the home-grown coder initiative on coding accuracy in DeWitt Army Community Hospital's Internal Medicine Clinic. The home-grown coder initiative is a training program designed to teach medical clerks how to code records. The study evaluated the accuracy of the home-grown coders after completion of the first phase of training, which consisted of six weeks of on-the-job training. Previous studies have appraised the difference in coding accuracy between providers and medical clerks, but no studies have been published evaluating the accuracy of medical clerks' coding after completion of an on-the-job training program. Sixty patient encounters were included in the provider data set, and fifty-six patient encounters were included in the home-grown coder data set. The data sets were analyzed for variance from a standard established by a certified coder. Between data set variance was also tested for significance. The analysis used the following statistical tools: Wilcoxon Signed-Rank Test, Mann-Whitney Test, Chi Square, and Fishers Exact Probability Test. Results showed the home-grown coders to be more accurate in coding Evaluation and Management codes, diagnoses, and procedures. These results indicate that implementation of a home-grown coder initiative will result in improved medical record coding.

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Introduction

DeWitt Army Community Hospital (DACH) is located on Fort Belvoir, approximately 20 miles southeast of Washington, District of Columbia (D.C.), and is the hub of the DeWitt Health Care Network (DHCN). The network consists of the hospital and four freestanding health clinics: the Fairfax Family Health Center (FHC), Woodbridge FHC, Rader FHC, and A.P Hill FHC. All of the family health centers are named by their location except for Rader Clinic, which is located on Fort Myer. The DeWitt Health Care Network is part of the Walter Reed Health Care System (WRHCS), which consists of DHCN, Fort George G. Medical Department Activity (MEDAC), and Walter Reed Army Medical Center. DeWitt's mission is to provide beneficiaries ready access to the appropriate level of quality, comprehensive medical care; to provide top quality primary and specialty care within the Walter Reed Health Care System partnership; to maintain and improve individual and collective readiness in support of national security objectives; and to support medical education and clinical research. The network's vision is to be the network of choice for Department of Defense (DoD) beneficiaries in Northern Virginia.

Built in 1957, DeWitt Army Community Hospital (DACH) is one of the oldest hospitals in the DoD's inventory. Originally designed to serve a much larger inpatient population, today the hospital operates 46 beds. In fiscal year (FY) 2002 DCHN provided 623,466 outpatient visits and dispositioned 3,098 patients for a total of 7,062 patient bed days. Currently there are approximately 83,000 beneficiaries enrolled to the network with enrollment growing at approximately 4% per year.

Conditions Which Prompted the Study

Health Insurance Portability and Accountability Act. In 1996 Congress passed the Health Insurance Portability and Accountability Act (HIPAA). Title II of HIPAA contains provisions for administrative simplification (Konstvedt, 2001). By requiring standardization of administrative and financial transactions Congress hoped to reduce healthcare costs and lessen the administrative burden on healthcare organizations.

National Defense Authorization Act. Congress continued toward its goal of streamlining healthcare administration in 1999 when it passed the National Defense Authorization Act for FY00. The act amended the statutory requirements for third party payers from reasonable costs to reasonable charges, thus bringing the Military Healthcare System (MHS) more in line with the civilian healthcare sector. The Department of Defense, Office of the Secretary (2002) defines third party payers as those organizations that are designed to provide compensation or coverage, i.e., insurance or medical services, for expenses incurred by a beneficiary for healthcare services or products. Reasonable charges are to be based on rates established by the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) under 32 CFR (Code of Federal Regulations) 199.14 to reimburse providers, with some exceptions. The amendments to the National Defense Authorization Act mandated DoD change from an all-inclusive one price billing system to itemized billing. Implementation of these changes will make the DoD's healthcare billing procedures more consistent with the civilian healthcare sector and should increase standardization in healthcare billing.

Outpatient Itemized Billing. On October 1, 2002 the MHS implemented outpatient itemized billing (OIB). With the start of OIB, third party payers are now able to audit the MHS at the local level, and may refuse payment if bills are coded incorrectly. Three years ago the Veterans Administration (VA) and some DoD facilities transitioned to semi-itemized billing, and were subsequently audited by third party payers. The audits uncovered improper coding and billing procedures, which resulted in the payers requesting over $700,000 for erroneous bills

(Tricare, 2002). The VA and the DoD have since conducted internal audits with similar findings to that of the third party payers. The Office of the Inspector General, realizing the MHS will face similar hurdles when implementing OIB, published compliance program guidance for hospitals to help improve billing accuracy.

The Ambulatory Coding Branch. In response to the increased emphasis on coding and billing, DHCN's leadership created a new branch called the Ambulatory Coding Branch (ACB). The new branch is composed of seven general schedule (GS) ambulatory coders, with four additional positions to be funded in FY04. The Ambulatory Coding Branch was placed under the management of the Patient Administration Division (PAD) and given the mission to provide coding service to all credentialed providers within DHCN.

Home-Grown Coder Initiative. As discussed in the literature review, market forces have driven the salaries of certified coders in Northern Virginia beyond the amount DeWitt can afford to pay. Faced with the need to improve coding accuracy, but unable to pay enough to contract or hire certified coders, DHCN's leadership developed and implemented a program to train medical clerks to become certified coders. The program, called the home-grown coder initiative, is a combination of on-the-job training (OJT) and formal coding education funded by DeWitt. The initial phase of training consists of six weeks of OJT working with the head of the Ambulatory Coding Branch, a civilian employee with many years of coding experience but no formal training. In February of 2003, DeWitt hired a certified coder who has taken over the role of overseeing the home-grown coders education.

After completion of the first phase of training, the home-grown coders then undergo a second phase of training, which consists of attending formal coding training classes provided by Physicians Enhancement Incorporated. The home-grown coders will attend coding classes for approximately three to six months, depending on their progress. Physicians Enhancement Incorporated is a private company that teaches medical record coding in the Northern Virginia area. During the second phase the home-grown coders continue to work at DeWitt fulltime, and upon completion of formal training and passing a national certification exam, the home-grown coders can advance to become GS-07 level employees. After one year of experience as a certified coder the employees are eligible to become GS-08 employees, providing they maintain their certification. To maintain certification coders must complete 15 to 18 hours of continuing education credits annually.

Statement of the Question

This study evaluates the accuracy of the home-grown coders after completion of phase one training and approximately six months of coding experience. The study will attempt to determine the impact of home-grown coder initiative on the accuracy of coding at DACH at the mid-point of the training program. The study will also outline what other healthcare organizations can expect in terms of improvements in coding accuracy by implementing a coding OJT program. If the program proves to be successful, other hospitals in the MHS may benefit from adopting the home-grown coder concept. Further evaluation of the program, after the home-grown coders complete the second training phase with PEI, is recommended to evaluate the program in its entirety.

Literature Review

The Effect of Market Forces on Certified Coders Salaries. Civilian healthcare institutions are experiencing pressure similar to that of the MHS to improve healthcare billing practices. One impetus to improve billing is the Medical Integrity Program established by Congress in 1996, which was designed to protect the Medicare Trust Fund by reducing payment errors. The program focuses on ensuring claims are accurate when first submitted, with the desired outcome of increased accuracy, resulting in increased efficiency and reduced expenditures. The Center for Medicaid and Medicare Services' (CMS) primary activities in the program include cost report audits, medical reviews, and anti-fraud activities. The Inspector General estimates that from the programs' inception in 1996 through 1999, the percentage of improper Medicare payments has decreased from 14% to 7.97% (Health Care Financing Administration, 2000). Healthcare organizations, if found guilty of fraudulent coding, must reimburse the Centers for Medicare and Medicaid the amount of the erroneous claims. This can have a devastating impact as numerous civilian healthcare organizations rely on Medicare funds to continue operating.

Many physicians fear being audited by CMS and intentionally under code visits as a tactic to avoid audits. In the April 2002 addition of QIPhysician.com, John W. McDaniel, the President and Chief Executive Officer of the Physician Management Group Inc., estimated that 80% of all doctors he works with under code, 15% over code, and approximately 5% code correctly (Neveleff, 2002). King, Sharp, and Lipsky (2001) found in their study that physicians over code 16% of all records, and under code 33%. In a study conducted by Kikano, Goodwin and Stange (2000), which reviewed the coding of over four thousand visits to family physicians, the researchers found 40% of all reviewed records were coded incorrectly with 19% of records being over coded and 21% under coded. Another study conducted by the VA found 40% of reviewed records were over coded with only 9% under coded, equating to 49% of all review records being coded incorrectly (Bhandari, 2001). Despite differences in instances of over, under, and correct coding, one thing is clear; few providers are coding correctly.

The Center's for Medicaid and Medicare increased scrutiny of medical record coding combined with the results from recent studies outlining problems with provider coding has resulted in a drastic increase in the demand for trained and certified coders. In response to the increase in demand for certified coders, salaries for these professionals have spiraled. The American Association of Professional Coders (AAPC) surveyed certified coders in 2000 and 2001 requesting information about their annual salaries. In 2000 the average reported salary was $35,646. In 2001 the average reported salary rose to $40,675, a 14% increase from the previous year (American Association of Professional Coders, 2002).

In addition to increased demand, supply has also had an effect on coders' salaries, as there is a shortage of certified/trained coders in the Northern Virginia area. Until recently, none of Northern Virginia's colleges or universities offered a certified coding curriculum. The high demand coupled with the low supply of certified coders caused the equilibrium price for coders, the price where the supply and demand curves meet, to be cost prohibitive for DeWitt (Lee, 2000). DeWitt's answer to its inability to hire certified coders is the home-grown coder initiative.

Similar Programs. The home-grown coder initiative is similar to programs started in hospitals throughout the United States to answer the nursing shortage. By hiring from within the organization and paying for employee education, DeWitt's leadership anticipates earning employee loyalty and retaining the employees after they become certified coders. Similar programs for nursing staff have proved to be successful. One such program implemented in the Baptist St. Anthony's Health System, in Amarillo, Texas, resulted in the hospital maintaining a 2% nurse vacancy rate (Amarillo Globe-News, 2002). This is especially notable considering the national average for nursing vacancy is approximately 13% with one in seven hospitals reporting a vacancy rate greater then 20% (American Hospital Association, 2002).

Coding History. To fully understand medical record coding it is helpful to understand the history of coding. To properly review the history of ambulatory medical record coding one must look at the three types of codes used for ambulatory patient encounters. These are the codes used to annotate the diagnosis, commonly referred to as ICD.9 codes, and the Current Procedural Terminology codes, or CPT codes, and Evaluation and Management codes (E&M). The Evaluation and Management codes are a type of CPT code used for documenting an encounter that primarily consists of evaluating and managing the patients' medical conditions via counseling.

Diagnoses (ICD) Coding. Medical coding dates back to the 17th century when John Graunt, in order to estimate the mortality rate of children less than six years of age, created the London Bills of Mortality. Systematic classification of diseases began in earnest in the 18th century with the works of Francois Bossier de la Croix, Linneaus, and William Cullen. Each of these gentlemen published their own disease classifications entitled: Nosologia Methodica, Geneva Morbordum, and Synopsis Nosolgiae Methodiace, respectively (Center for Disease Control, 2003).

Disease classification continued to evolve and in 1855 William Farr of England and Marc d'Espine of Switzerland, presented their classification systems to the International Statistical Congress. The Congress combined the works and published a revised list entitled "Sur le modele de celle de W. Farr" (Center for Disease Control, 2003). Farr's disease classification system was based on five separate categories: epidemic diseases, local diseases arranged by site, developmental diseases, constitutional or general diseases, and injuries. This system of classification eventually evolved into the International List of Causes of Death, the precursor to the International Classification of Diseases or ICD (O'Mahony, 1997).

In 1891 the International Statistics Institute, the successor to the International Statistical Congress, tasked a committee with preparing a list of causes of death. Jacques Bertillion of

France was appointed chairman of the committee, and in 1893 he presented the committee's work entitled the International List of Causes of Death, to the Institute. The Institute adopted the list and subsequently published revisions of the list in 1900, 1910, and 1920 (Center for Disease Control, 2003).

During this time Bertillon was the primary proponent of the list, and his death in 1922 left the Institute void of leadership. The lack of leadership within the Institute compelled the organization to collaborate with the Health Organization of the League of Nations. In 1928 the Institute and the Health Organization of the League of Nations formed the "Mixed Commission" to work on revising the list. The Commission remained the proponent of the list through 1945 (Center for Disease Control, 2003), during which time the fourth and fifth revisions were published.

In 1946 the World Health Organization (WHO) took over responsibility for the list, initiating the sixth revision which included sweeping changes. Two major changes in the sixth revision were the inclusion of lists for mortality and morbidity and the recommendation for cooperation between national statistical institutions and the WHO.

Between 1949 and 1965 the list underwent two subsequent revisions. Work on the ninth revision, commonly referred to as ICD.9, started in 1969 and concluded in 1976 with its adoption by the twenty-ninth World Health Assembly. The ninth revision contained major changes such as a detailed list of three-digit category codes and optional four-digit subcategory codes. The ninth revision also included for the first time V codes. V codes are used to annotate reasons for patient encounters, such as counseling, or other factors related to patients health status.

Despite the publication of version ten in 1992, most patient encounter coding systems are still based on ICD.9 and a set of clinical modifications to ICD.9 published by the United States

National Center of Health Statistics, referred to ICD.9-CM. The ICD.9-CM is compatible with the ICD.9, but contains added detail not included in ICD.9 (National Center for Health Statistics, 2003).

Current Procedural Terminology (CPT) Coding. The American Medical Association published the first edition of the Physicians' Current Procedural Terminology in 1966. At the time Current Procedural Terminology codes, or CPT codes, consisted of four digits and were used primarily to promote the use of standard terms and descriptions for patient encounters. The first edition consisted mainly of surgical procedure codes, but included narrow sections on laboratory and radiology procedures as well as a limited section on medicine (Bracco, 2002). The second edition was published in 1970. This edition contained several revisions including the expansion of codes from four digits to five. The change to a five digit code allowed for greater detail when coding patient encounters. The second edition also included a section on internal medicine and greatly expanded the previous sections on surgery, medicine, and laboratory and radiology services. Between 1970 and 1977 the publication underwent three subsequent revisions. Changes to CPT codes included updates for coding medical technology utilized in patient encounters (Medical Distribution Solutions, Inc, 2001).

Health Care Finance Administration. In 1983 the Health Care Financing Administration (HCFA), now called the Center for Medicare and Medicaid (CMS), developed the HCFA Common Procedure Coding System (HCPCS). The codes used for this system are commonly referred to as HCPCS, pronounced hick-picks. The Health Care Financing Administration's coding system contains three levels of codes. First level codes consist of the CPT codes published by the AMA (Bracco, 2002).

Level two HCPCS codes, also known as national codes, are supplements to the CPT codes. Level two codes cover things not included the CPT listing such as non-physician procedures and administration of injectable drugs. Level three codes are called local codes. These codes are created by Medicare carriers for use within their geographic area. Medicare carriers create local codes when no national or CPT codes currently exist for the procedure or supply item they wish to code. (Bracco, 2002).

The Military Healthcare System. The MHS uses HCPCS and a few codes unique to the Military. One such unique code is CPT code 99499. This code is used to fill the E&M code field in the Composite Health Care System (CHCS) when the CPT code for the procedure performed during the patient encounter does not require an E&M code. Unlike civilian healthcare systems, CHCS requires an E&M be listed for every patient encounter. At the Military Treatment Facility level HCPCS, whether they are level one, two, or three, are commonly referred to as CPT or E&M codes, and will be referred to as such through out this paper.

Relative Value Units. In 1992 CMS, formerly HCFA, transitioned to an outpatient payment methodology for part B services, based on the Resource Based Relative Value System (RBRVS), (Glass & Anderson, 2002). Prior to 1992 reimbursement for outpatient healthcare services was based on reasonable charges. A reasonable charge, as defined by CMS, is the lowest of three specific charges. The three charges are: the physician's customary charge, the customary charge for that service in the community, and the actual charge for performance of services (Gapenski, 2001).

The Resource Based Relative Value System bases reimbursement on three components: physician work, practice expense, and professional liability. Each HCPC has a relative value unit (RVU) for each component. The sum of the components multiplied by a conversion factor equates to a dollar amount associated with that particular code. The dollar amount is then adjusted for regional cost variation, resulting in the fee charged for that service. Each year CMS and St. Anthony's, formerly McGraw-Hill, publishes a revised RBRVS listing. The military health system utilizes a combination of CMS, St. Anthony's, and its own unique RVU weights. Unique additions to the RVU list include weights for procedures usually conducted by non-physicians. In both the CMS and St. Anthony's publication these procedures are given zero weight, but the MHS gives them the same weight as when the procedure is preformed by a physician. Another difference between civilian RVUs and MHS Relative Value Units is that the MHS only uses the work component to determine the weight of the code. Unlike the civilian sector, which uses the work, practice expense and professional liability components to calculate Relative Value Units.

There are three types of RVU measurements: simple, adjusted and provider. Simple RVUs are calculated by adding the weight of all CPT codes listed for the patient encounter. The sum of the weights is the simple RVU. Adjusted RVUs are calculated by adding the full weight of the primary CPT code to 50% of the sum of the secondary CPT codes. Provider RVUs are calculated by multiplying the adjusted RVU by the provider weight, which is determined by the type of provider performing the service. For example, if a physician performs a procedure the adjusted RVU is multiplied by one, but if the procedure is provided by a Physicians Assistant, the adjusted RVU is multiplied by .76 (Sandy Rogers, personal communication, November 14, 2002). Throughout the remainder of this paper all RVUs will be calculated using the simple methodology.

Coding Methodology Prior to Implementation of the Home-Grown Coder Initiative

Prior to implementation of the home-grown coder initiative, coding at DeWitt was conducted by providers or medical clerks depending on the clinic. Typically providers coded patient encounters at the end of the workday based on the note they had placed in the patient's medical record or, if they no longer have the patient's medical record or a copy of the note, their memory of the visit. The providers entered the codes for each patient visit into CHCS via the Ambulatory Data Module (ADM). The data was then electronically pulled from ADM into the billing module. Once the data was transferred from ADM into the billing module, Patient Administration Division (PAD) personnel generated bills and sent them to insurance companies as appropriate. During this process there was usually little to no feedback given to providers on the accuracy of their coding. Additionally, few providers received formal training on medical records coding; most providers learned coding informally from coworkers or their superiors, most of who also lacked formal training.

Purpose of the Study and Utility of Results

The purpose of the study is to evaluate the accuracy of home-grown coders after the first phase of training and compare the accuracy of their coding to that of healthcare providers. Coding accuracy will be determined by the variance from coding performed by a certified coder. Evaluating the home-grown coder initiative after the first phase of training will provide valuable information to the organization. A positive change in coding accuracy will affirm the efficacy of the OJT process. Conversely, a lack of significant improvement or a decrease in coding accuracy will indicate the need to revise the training program prior to filling the FY04 authorizations. A decrease in coding accuracy will also indicate the need to hasten the start of formal education for the current home-grown coders.

Methods and Procedures

Data Collection Process

A retrospective study of DACH's patient medical records and automated data system (ADS) records was conducted to determine the accuracy of the home-grown coders and providers. The first step of the data collection process involved querying the Military Healthcare System Data Mart (M2) for patient encounters that occurred in February of 2002 in DACH's Internal Medicine (IM) Clinic. The query also included coding data elements associated with each clinic visit. Only patient encounters for patients with one visit to the IM Clinic in February 2002 were included in the data draw. It was necessary to exclude patients with multiple visits because the data for the two visits would be combined in M2. For example, if a patient visited the IM Clinic twice and the first visit generated 1.2 RVUs and the second visit generated .65, in M2 the RVUs would be listed as 1.85, making it impossible to determine how many RVUs were generated by the first visit and how many were generated by the second. The second step involved utilizing the Composite Health Care System (CHCS) to determine which patients (identified in step one) maintained records at DeWitt. Step three consisted of pulling the medical records associated with the visits and copying the Standard Form (SF) 600, which was used to document the encounter. Both initial and follow-up visits were included in the study. Follow-up visits were included as long as the initial visit did not occur in February. The fourth step involved the certified coder receiving copies of each SF600. The certified coder then coded each SF600 to establish a coding standard. The final step involved a comparison of the original coding and the coding conducted by the certified coder, focusing on Evaluation and Management (E&M) coding and the number of diagnoses and procedures coded. During this process security measures were taken to safeguard patient information by destroying the SF600s after the data was entered into the Statistical Package for Social Sciences (SPSS). Prior to their destruction, the SF600s were kept in a locked cabinet that only the researcher could access. During the data entry process no unique patient identifiers, such as social security numbers, were used. Additionally, the records were not identified as to which provider or home-grown coder performed the initial coding.

Steps one through four were repeated for visits to the IM Clinic in February 2003. The visits in the second data set were initially coded by the home-grown coders and then recoded by the certified coder to establish a benchmark. The results from two data sets were then compared to identify any change in coding accuracy since implementing the home-grown coder program.

Sampling Design

After patient encounters for February 2002 and 2003 were identified, a random number table was used to determine which patient's SF600s would be utilized in the study. This process involved selecting a random number then identifying patient medical records with the corresponding second to last digit in the patient's social security number. The second to last digit of the social security number was used because the MHS groups patient medical records by the second to last digit and then files each record in numerical order within the grouping. Each data set was selected from the entire month of February to ensure a representative sampling of diagnoses and procedures.

Validity and Reliability

To ensure validity, the same procedures were utilized for both data sets. Additionally, a certified medical record coder with fifteen years of coding experience was used to establish the standard against which the providers and home-grown coders were measured against. Utilizing a certified coder with multiple years of coding experience helped ensure the standard to which both groups were compared was accurate. Utilizing other means, such as coding performed by non-certified personnel or certified personnel with little experience, to establish a standard could result in setting an incorrect standard. This could result in a type one error, which would cause you to incorrectly accept the null hypothesis and reject the alternative hypothesis. The null hypothesis is that there is no difference between coding conducted by the providers or home-grown coders and the certified coder. The alternate hypothesis is that there is a difference in the coding. Utilizing a certified coder with several years of coding experience to establish the gold standard increases the likelihood that you will be comparing the data samples against properly coded records.

Limitations

One limitation of the study is that it only analyzed coding conducted for Internal Medicine Clinic patient encounters. This may not be a true reflection of coding throughout DCHN. Coding in specialty areas may be more accurate due to the specificity, and thus reduced scope, of patient encounters. Providers in the Internal Medicine Clinic typically see patients with co-morbidities and multiple medical problems which can make coding patient encounters more difficult. Another limitation of the study is its lack of third party collection data. With the implementation of outpatient itemized billing, the amount billed for similar appointments changed as of October 1, 2002. This change in billing acts as a confounding variable preventing any conclusive correlation between changes in coding practices and changes in collections between FY03 and previous years.

Data Analysis

The first step in data analysis is to determine what statistical analysis tool to use. Both the home-grown coder and provider data sets contain matched pairs. When seeking to analyze paired data the first test that comes to mind is the paired t-test. In order to ensure the paired t-test provides correct results the data must meet three criteria:

> (1) that the scale of measurement for Xa and Xb has the properties of an equal-interval scale, (2) that the differences between the paired values of Xa and Xb have been randomly drawn from the source population, and (3) that the source population from which these differences have been drawn can be reasonably supposed to have a normal distribution. (Lowery, 2003 ¶ a)

Both data sets met the first two criteria, but failed to meet the third. Appendices A and B contain histograms of the provider and home-grown coder data sets which graphically illustrate the data's failure to assume a parametric, or normal, distribution. As seen in each histogram, the data does not form a bell shape required for the data to be parametric; therefore this indicates that the data is nonparametric. An alternative to the paired t-test for non-parametric data is the Wilcoxon Signed-Rank Test. Although the Wilcoxon Test does not require the data to be normally distributed, the test does assume that the difference between data pairs is symmetric. Since both the home-grown coder and provider data sets met this assumption, the Wilcoxon Test was used to analyze the variation from the standard for RVUs, diagnoses, and procedure coding.

After the within data set variance was analyzed for the home-grown coders and the providers, the difference between the two data sets was analyzed. The first step in analyzing the differences was to check to see if the data satisfied the t-test criteria. The criteria for using a t-test are the same as those previously listed for a paired t-test. As with the within data set analysis, the between data sets data did not assume a normal distribution and required the use of non-parametric statistical tools. The Mann-Whitney Test is an alternative to the t-test for non-parametric data. This test evaluates the significance of the difference in means. The Mann-

Whitney Test was used to assess the difference in the home-grown coders' and providers' variation from the standard for RVUs, diagnoses, and procedure coding.

Evaluation and Management coding was evaluated utilizing different statistical tests than the tests used to analyze RVUs, diagnoses, and procedure coding. Each E&M code produced by the home-grown coders and the providers was categorized as being over, under, correctly or inappropriately coded based on a comparison against the standard established by the certified coder and formatted as binomial data. Because the data was formatted as binomial, the Chi-Square Test was the most appropriate tool for analyzing the significance of the occurrence of over, under, correct, and inappropriate E&M coding.

To test the significance of the between data set variance the Fisher Exact Probability Test was used. This is a version of the Chi-Square Test and it is used for data sets that contain two columns and two rows. One advantage of Fisher Exact Probability Test is that unlike Chi-Square Test, it can be used as a directional test. Another benefit is that the Fisher Exact Probability Test will work for data sets with mean chance expected values (MCE) less than five. Since the data set contained several mean chance expected values less than five, the Fisher Exact Probability Test was more appropriate than the Chi-Square Test.

Results

Evaluation and Management Codes

The first indicator of coding accuracy analyzed was the selection of E&M codes by the home-grown coders and the providers. All records in both data sets were categorized as being over, under, correctly, or inappropriately coded, based on the variation of E&M coding from the standard established by the certified coder. A record was categorized as over coded if the E&M code required a higher level of acuity or complexity then the E&M code selected by the certified coder and vice versa for under coded encounters. Patient encounters were considered to be incorrectly coded if a home-grown coder or provider selected an E&M code that indicated a new patient visit when the certified coder selected an E&M code for a follow-up visit, and vice versa.

The analysis showed that the home-grown coders correctly coded 50% of encounters, over coded 35.7%, and under coded 14.3% of patient encounters. The incidence of over and under coding was found to be significant at the $p<.05$ and $p<.001$ levels, respectively. There were no incidents of inappropriate coding by the home-grown coders (Table 1).

Providers were found to have coded 16.7% of patient encounters correctly, over coded 68.3% and under coded 5% of patient encounters and inappropriately coded 10% (Table 1). The incidence of under, correct, and inappropriately coded records was found significant at the $p<.001$ level, while incidence of over coding was significant at the $p<.01$ level.

Table 1

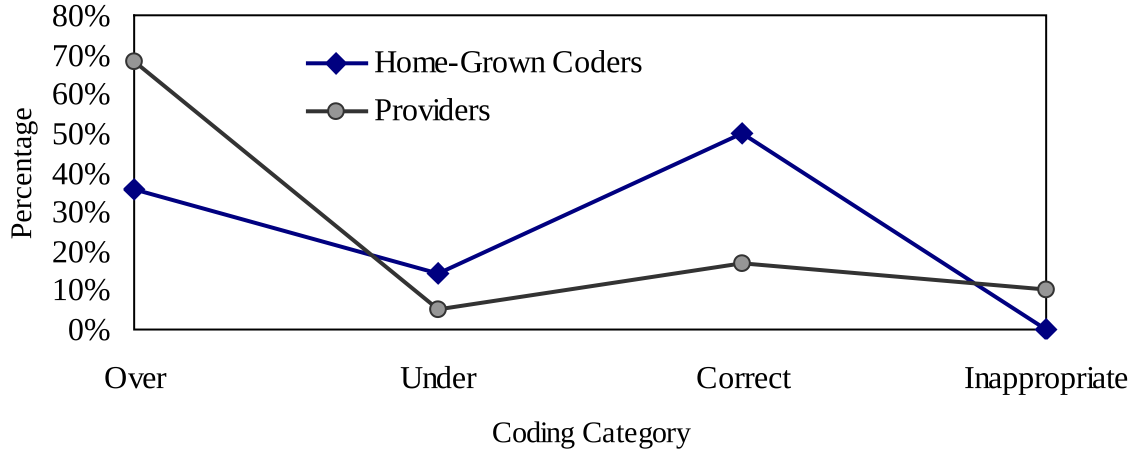
Evaluation and Management Codes

Coding Group	Correct	Over	Under	Inappropriate
Home-grown Coders	$50\%_a$	$35.7\%_a$	14.3%	$0\%_a$
Providers	$16.7\%_a$	$68.3\%_a$	5%	$10\%_b$

Note. Percentages in the same column with the same subscripts differ at the $p<.001$ level, percentages in the same column with different subscripts differ at the $p<.05$ level, by the Fisher Exact Probability Test.

The Fisher Exact Probability Test found the difference between the incidence of over coding and correct coding by home-grown coders and the providers was significant at the $p<.001$ level. The difference between the incidence of inappropriate coding by home-grown coders and the providers was also found to be significant, but at the $p<.05$ level, while the difference in under coding was not found to be significant ($p>.05$), (Table 1). Figure 1 graphically depicts the occurrence of over, under, correct, and inappropriate coding.

Figure 1. **Percentage of records over, under, correctly and inappropriately coded.**



Diagnoses (ICD.9 Codes)

The second indicator analyzed was the number of diagnoses coded per patient encounter. On average both the home-grown coders and the providers coded more diagnoses as compared with the certified coder. The Wilcoxon Test found the difference between the average number of diagnoses coded by the home-grown coder and the certified coder to be significant at the .001 level. The difference between the average number of diagnoses coded by the providers and the certified coder was also found to be significant at the .001 level (Table 2). The diagnoses data points were also formatted according to the variance from standard. For example, if the home-grown coder coded one diagnoses for a patient encounter while the certified coder coded two, the corresponding data point would be a negative one. The variance in diagnosis coding between the home-grown coder data set and the provider data set was shown to be significant at the .01 level via the Mann-Whitney Test.

Table 2

Average Diagnoses (ICD.9 codes) Coded per Patient Encounter

	Number of Diagnoses		Certified Coder/Standard	
Data Set	Mean	SD[a]	Mean	SD[a]
Home-Grown Coders	2.95_b	± 1.151	1.88	± .916
Providers	3.03_b	± 1.178	1.37	± .610

Note. Means in the same column that share subscripts differ at the .01 level by the Mann-Whitney Test. [a] Standard Deviation

Procedures (CPT Codes)

The third indicator of coding accuracy reviewed was the average number of procedures coded for each patient encounter. In the home-grown coder data set neither the home-grown coders, nor the certified coder, coded any procedures. In the provider data set the providers coded 13 procedures while the certified coder coded none. The Wilcoxon Test showed this difference to be significant at the .001 level. The Mann-Whitney Test found the variation in procedure coding between the home-grown coder data set and the provider data set significant at the .01 level.

Relative Value Units

The final indicator of coding accuracy analyzed was the average RVU generated by the coding performed by the home-grown coders and providers as compared to the average RVU generated by the coding performed by the certified coder. This indicator provides a comprehensive overview of coding accuracy, as simple RVUs are the sum of the weighted values of the E&M and CPT (procedure) codes for a patient encounter. Table 3 displays the means for the RVUs generated by the coding performed by the home-grown coders, providers, and the certified coder. The Wilcoxon Test found the difference in RVUs generated by the home-grown coders and the certified coder significant at the .01 level. The difference in RVUs generated by the providers and the certified coder was also significant, but at the .001 level. The Mann-Whitney Test found the variation in RVUs between the home-grown coder data set and the provider data set significant at the .001 level.

Table 3

Average Relative Value Units Per Patient Encounter

			Certified Coder/Standard	
	Mean	SD[a]	Mean	SD[a]
Home-grown coders	$.7846_b$	$\pm$ .2432	.6880	$\pm$ .2193
Providers	1.1093_b	+ .3459	.6968	+ .3361

Note. Means in the same column that share subscripts differ at the .001 level by the Mann-Whitney Test. [a] Standard Deviation

Figures 2 and 3 show a graphic depiction of the difference in RVUs generated from the visits coded by the home-grown coders and the certified coder, and by the providers and the certified coder, respectively. In both figures over coded records are indicated by black diamonds located directly above white squares. Under coding is indicated by black diamonds below white squares, and a line of black squares indicates correct coding. The distance between the diamonds and squares indicates the magnitude of the difference.

Figure 2. **Home-Grown Coder/Certified Coder RVU differences**

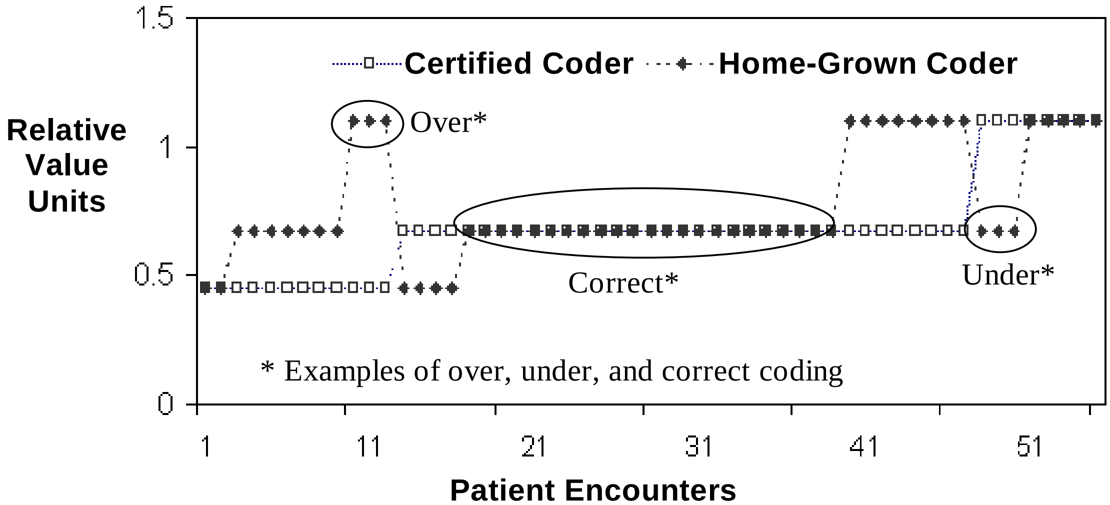
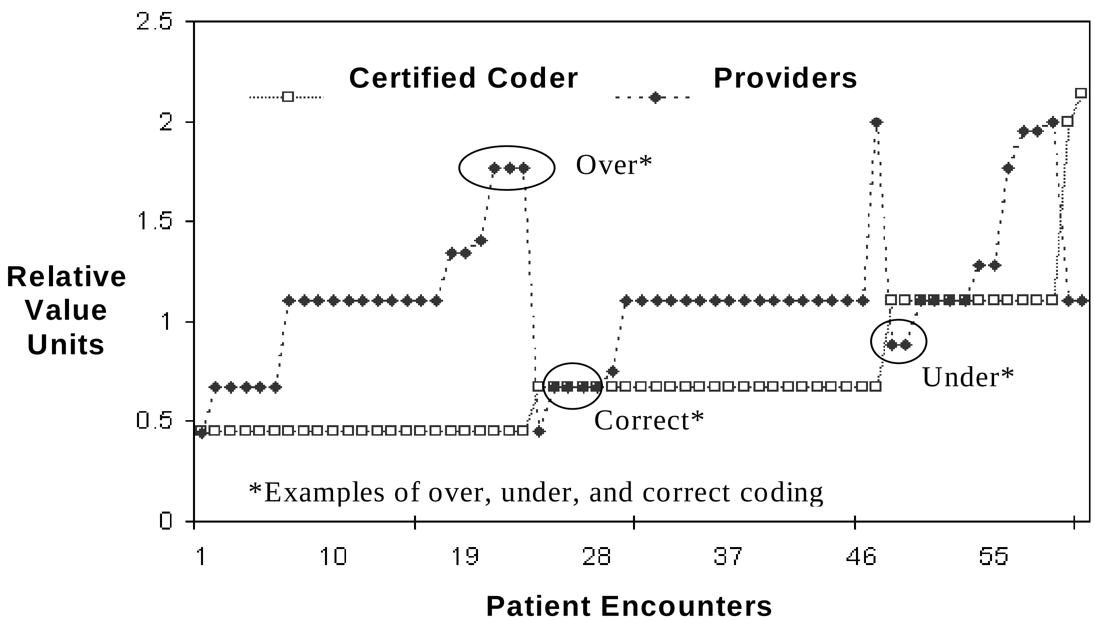


Figure 3. **Provider/Certified Coder RVU Differences**



Discussion

The results of this study indicate that the accuracy of coding in DeWitt's Internal Medicine Clinic has increased since the implementation of the home-grown coder initiative. Home-grown coders were found to be more likely than providers to select correct evaluation and management codes, while providers were more likely to over code and use inappropriate codes. The results of the study also found that the home-grown coders were more accurate in coding diagnoses and procedures as compared to providers.

The results from this study are both similar and dissimilar to the results reported by Captain Eric Poulsen in his Graduate Management Project (GMP), (2002). In his GMP Captain Poulsen analyzed the coding accuracy of physicians compared with medical clerks at Walter Reed Army Medical Center. Similar to this study Captain Poulsen found that medical clerks were less likely to over code and more likely to select the proper E&M code, while physicians were more likely to over code. The studies differed in the area of diagnoses and procedure coding. In his study Captain Poulsen found that physicians were more accurate in both of these areas.

There are several potential reasons why the home-grown coders proved to be more accurate at coding records compared to providers. The first potential reason is the home-grown coders are likely to possess a greater understanding of coding as compared with providers. During the OJT phase the home-grown coders became very familiar with the criteria required to use various codes. The home-grown coders, at the point of evaluation, had six months of work experience. During this time their coding was continually evaluated and they were able to learn from mistakes. The home-grown coders were also able to ask the supervisor of the ambulatory coding branch questions pertaining to coding regulations. Conversely, providers’ coding is rarely, if ever, evaluated so they have no opportunity to learn from past mistakes. Also few providers receive comprehensive coding training and rarely receive notice of changes to coding guidelines.

Another potential reason for the increased accuracy of the home-grown coders is insufficient documentation of what occurred during the patient encounter. The home-grown coders are only able to code for procedures, diagnoses, and acuity levels that are documented, while the providers may be coding what actually took place during the visit, while failing to adequately document these occurrences. Evidence of this can be seen in the procedure data. In the provider data set, the providers coded for 13 procedures while the certified coder coded none. A rational conclusion is that the providers did in fact perform the procedures, but failed to adequately document the services provided. Without adequate documentation the certified coder has no knowledge of what actually occurred during the patient encounter and is unable to code all services provided. This train of thought is also supported by the home-grown coder data set. In this data set neither the home-grown coders, nor the certified coder coded any procedures. Failing to adequately document the procedures would prevent both the certified coder, and the home-grown coders from coding procedures. This hypothesis can also be made for the decrease in number of diagnoses coded per encounter by the certified coder and the home-grown coders. Further study is needed to determine if lack of documentation is the causal factor behind the discrepancy in procedure and diagnoses coding by the providers and the certified coder.

Recommendations

Home-Grown Coder Training

As evidenced by this study, utilizing an on-the-job-training program to teach medical clerks to code medical records may have positive effects on coding accuracy as compared to using providers to code records. While the home-grown coders proved to be more accurate than providers, there is still considerable room for improvement. The results of the study emphasize the importance of including phase two, formal coding education, in the training plan. After completion of formal training the accuracy of coding conducted by the home-grown coders should drastically improve. Although they are coding more accurately than providers, there is need for continued oversight of the home-grown coders' work, especially under the itemized billing system. The home-grown coders work should be closely monitored until completion of the formal education phase and each home-grown coder proves to have a coding accuracy level well above 90%. Also a continuing education program should be developed and implemented to inform home-grown coders of changes to coding guidelines and to ensure they are maintaining their coding skills. The continuing education program developed by the MTF is an important addition to the civilian continuing education credits required to maintain certification, as the MHS may undergo coding regulation changes that the civilian coding community is unaware of.

Provider Education

A training plan should be developed to instruct providers on the documentation required to code for the different levels of evaluation and management codes. Additionally education plans should be developed to instruct providers on the required documentation for their respective services' top five to ten diagnoses and procedures. Not only will instructing providers on documentations requirements improve coding by providers, but it will also enable the organization to quantify its productivity and to bill for all services provided.

If some providers are going to continue to code, a more in-depth training program should be developed to instruct the providers on the intricacies of CPT, ICD.9, and E&M coding. This training should include reference material and a periodic analysis and review of provider coding accuracy. It is essential that the training include feedback to the providers on their coding accuracy. Without a feedback mechanism to inform providers of incorrect coding, they will continue to code inappropriately.

Other options available to organizations who are unable or unwilling to hire certified coders include super-bills and coding software. Super-bills can be purchased or generated in house, and are typically clinic specific and contain codes and short bullet statements describing the code for the procedures, diagnoses, and E&M codes most frequently used. The use of super-bills can assist providers with coding, but present the same problem with documentation. The corresponding documentation must be entered into the patient's medical record or the coding will be inaccurate.

Numerous software applications are available to assist with coding. These programs range from electronic copies of coding guidelines, to electronic super-bills, to electronic self-coding medical records. There are also several types of data entry systems. Data can be entered via a keyboard, mouse, or voice recognition systems. There are many companies that offer coding software products. An Internet search for medical record coding software using the Google search engine generates over 94,000 hits. E-MDs is one vendor of electronic coding and billing products. Their products range from E&M coders for Palm Pilots and Personal Digital Assistants (PDAs) to specialized coding programs for cardiology and urology. The e-MD website promises a full return on investment within one day of utilizing one of their E&M coding products (2002).

The Veteran's Administration Medical Center in Cheyenne, Wyoming recently purchased a computerized coding system for their inpatient and ambulatory clinics. LaRoy Brooks, the Chief, Health Information Management Officer for the Medical Center reported bids for the coding system ranged from an annual cost of $7,000 to $15,000 (2002). The hospital organization chose a computer system that cost $599 per month, or just over $7,000 annually.

Brooks reported that employment of the computerized coding system resulted in a drastic reduction of coding errors.

Whether electronic systems, super-bills, or traditional coding practices are utilized, both providers and coding personnel should be involved in developing a coding and documentation surveillance program. The program should include feedback to providers on how their documentation translates into CPT and E&M codes. Without continued communication between providers and coders the potential for erroneous coding, in the terms of coding what occurred during the patient encounter versus what was documented, multiplies exponentially. The program should also include a standard for coding accuracy and periodic review of records to ensure the standard is being met.

Implementation of Similar Programs

The results of the study indicate that implementing a home-grown coder program in other MTFs may have a positive effect on coding accuracy. However, the study also showed that it can have a negative effect on RVUs. With this in mind, it is essential that a program to educate providers on proper documentation techniques is implemented in conjunction with the home-grown coder program. Implementing the documentation program along with the home-grown coder initiative should help the organization avoid a decrease in RVUs.

Based on the results of the study a change to the current start of the second phase of training is recommended. Due to lack of formal training opportunities DeWitt's home-grown coders did not start formal training until they had been coding for at least five months. Having the home-grown coders start formal training earlier in the process should decrease the time required to learn more advanced coding concepts. Additionally having the home-grown coders undergo OJT training with a certified coder with several years of experience should also quicken the learning process.

Additional Study

Additional study and evaluation of the home-grown coder is needed to determine the effectiveness of the program in its entirety. The program should be evaluated again after completion of the home-grown coders' formal training phase to determine coding accuracy. The program also should be monitored to determine the length of time the home-grown coders remain employed at DeWitt after they achieve their certification. Additionally, third-party collection data should be analyzed to determine if DeWitt has received a return on its investment.

Conclusion

The results of this study show that implementation of a home-grown coder initiative can have a positive effect on medical record coding accuracy within Military Treatment Facilities. Hiring and promoting people from within the organization should increase employee loyalty and may result in retention of home-grown coders after they acquire certification, however this remains to be seen.

The benefits of accurate coding are four-fold. The first benefit is increased reimbursement to the organization. Accurate coding should reduce the incidence of rejected claims and should prevent duplication of work due to correcting erroneous coding. The second benefit is avoidance of legal problems. Accurate coding should prevent audits and claims for erroneous coding. The third benefit is the ability to measure the organization's and individual provider's productivity. This is possible through the RVUs generated by coding. Accurate documentation of productivity can provide data needed to successfully request additional funding and/or staff. The final benefit, and the one medical coding originated from, is the organizations' ability to track population health data. Accurate coding can provide the data required to inform a command about the health status of its beneficiaries and can provide insight into what type of health initiatives are needed.

With so much riding on accurate coding, Military Treatment Facility commanders must decide what certified coders are truly worth to the organization. If further study of the home-grown coder program reveals that the coders leave shortly after attaining certification MTF commanders should strongly consider using funds from the third party collection program to hire certified coders or to supplement certified coder salaries. This is especially important in areas such as Northern Virginia where market forces have elevated certified coder salaries. Employing certified coders, whether they are home-grown, contract, or G-S employees will have innumerous positive effects on healthcare organizations.

Appendices

Appendix A

Provider Data Set Histograms

***Figure A1.* Certified Coder E&M Coding for the Provider Data Set**

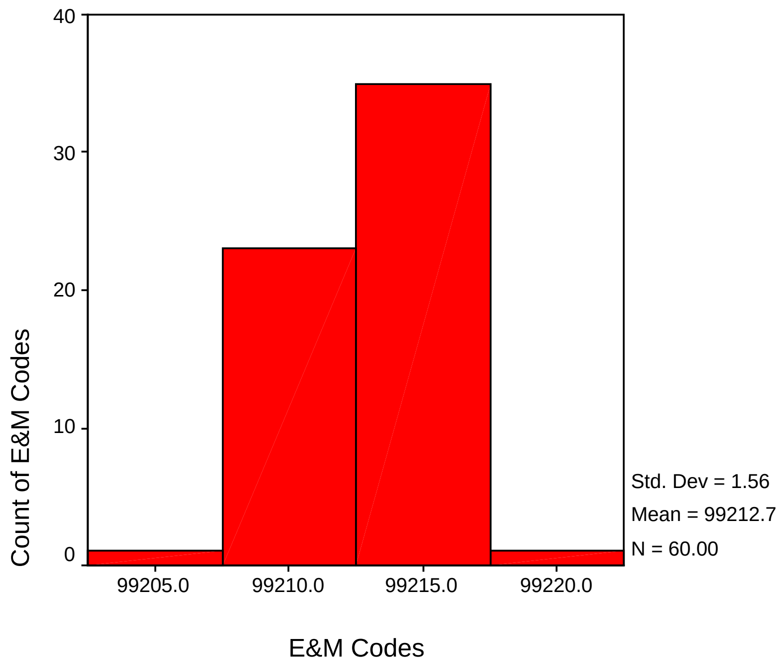


***Figure A2.* Provider E&M Coding**

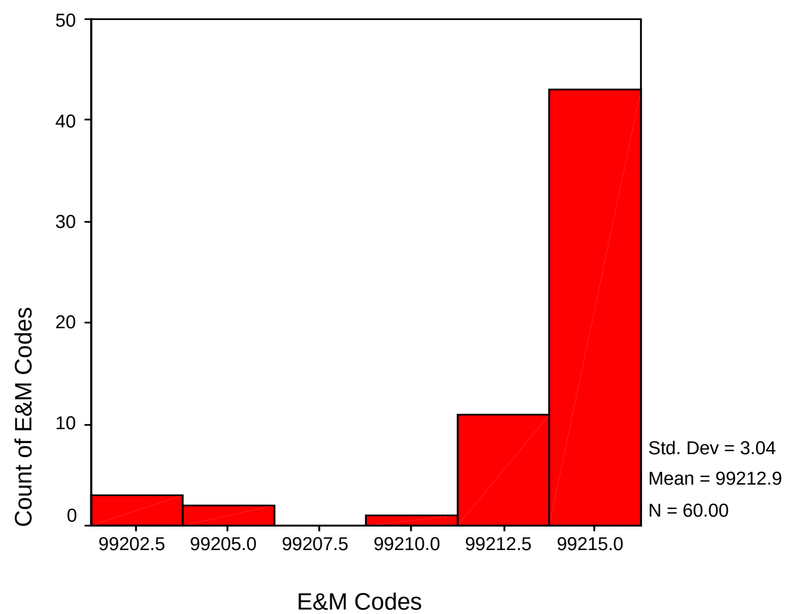


Figure A3. **Certified Coder Diagnoses Coding for Provider Data Set**

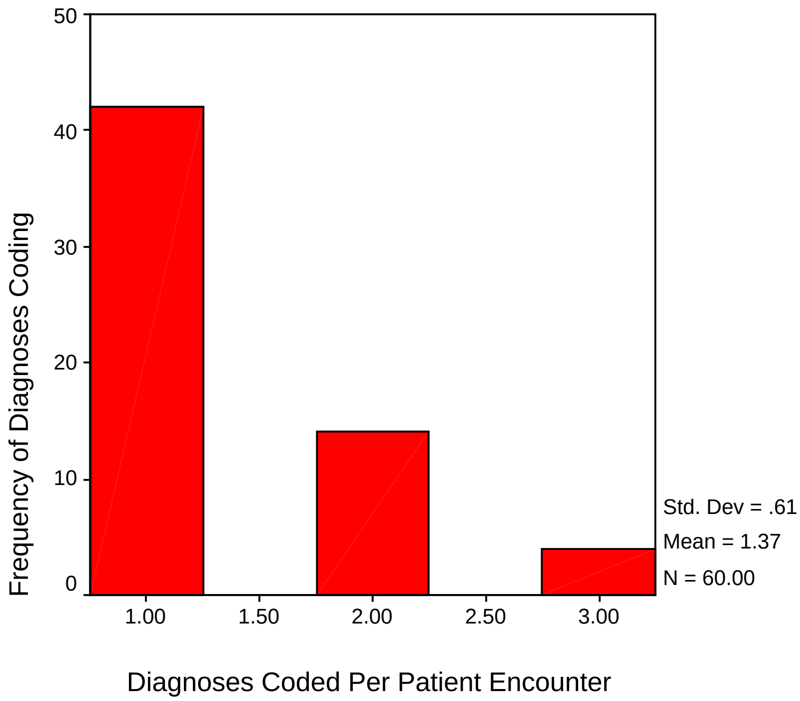


Figure A4. **Provider Diagnoses Coding**

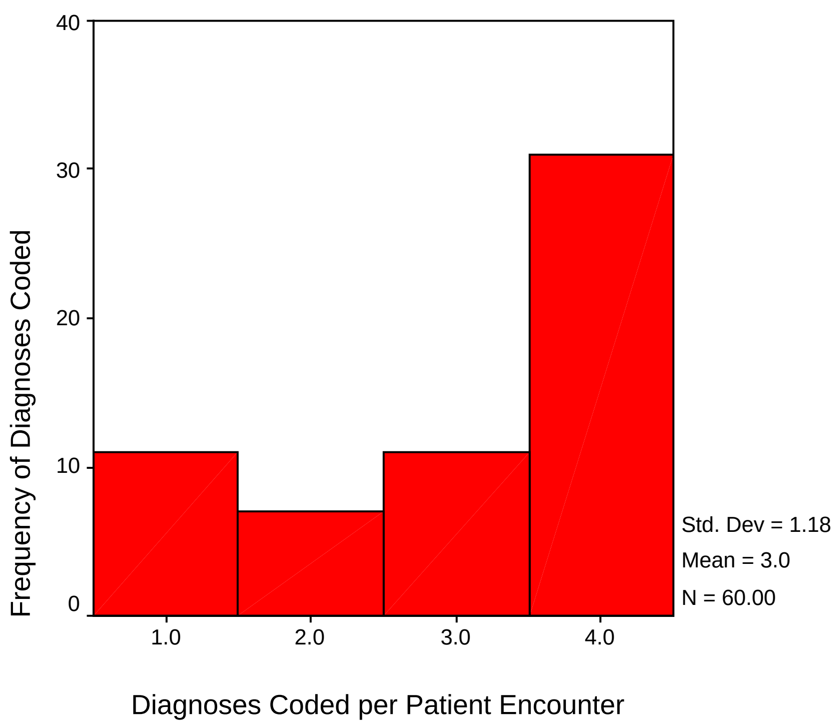


Figure A5. **Certified Coder Procedure Coding for Provider Data Set**

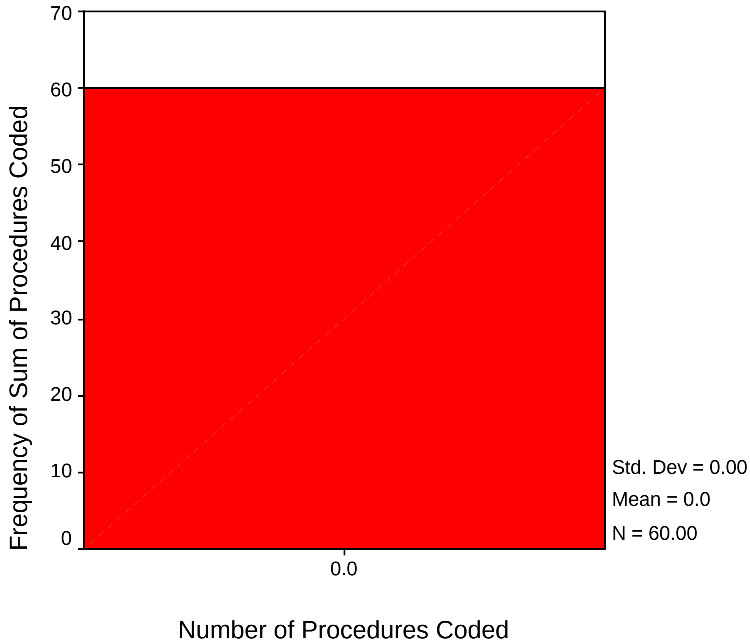
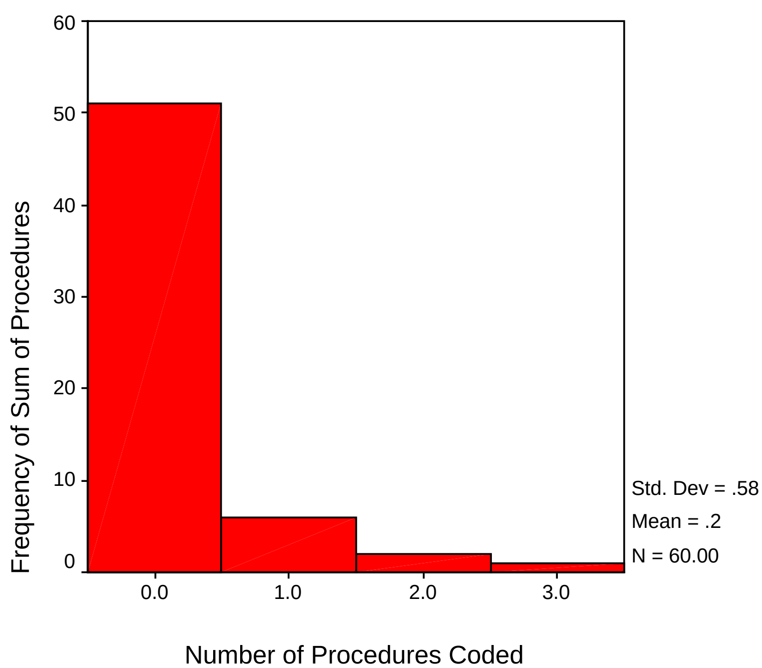


Figure A6. **Provider Procedure Coding**



Appendix B

Home-Grown Coder Data Set Histograms

***Figure B1.* Certified Coder E&M Coding for the Home-Grown Coder Data Set**

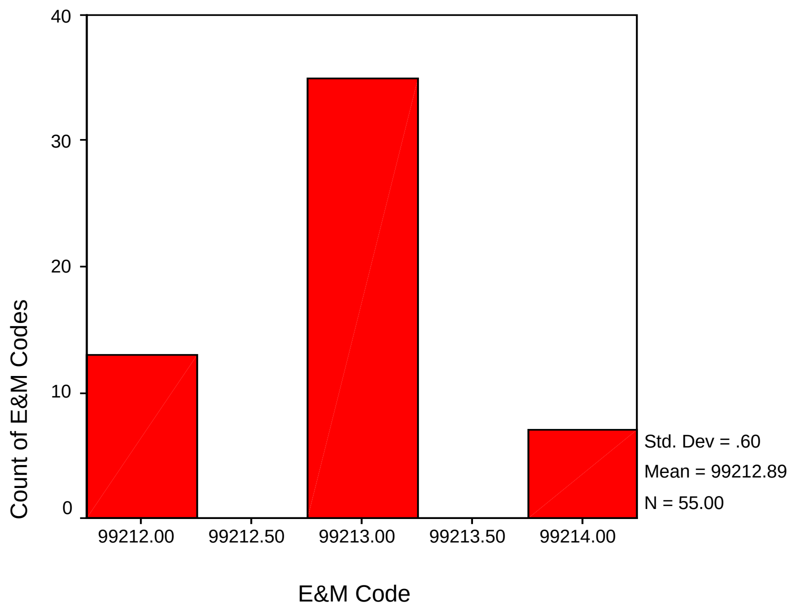


***Figure B2.* Home-Grown Coder E&M Coding**

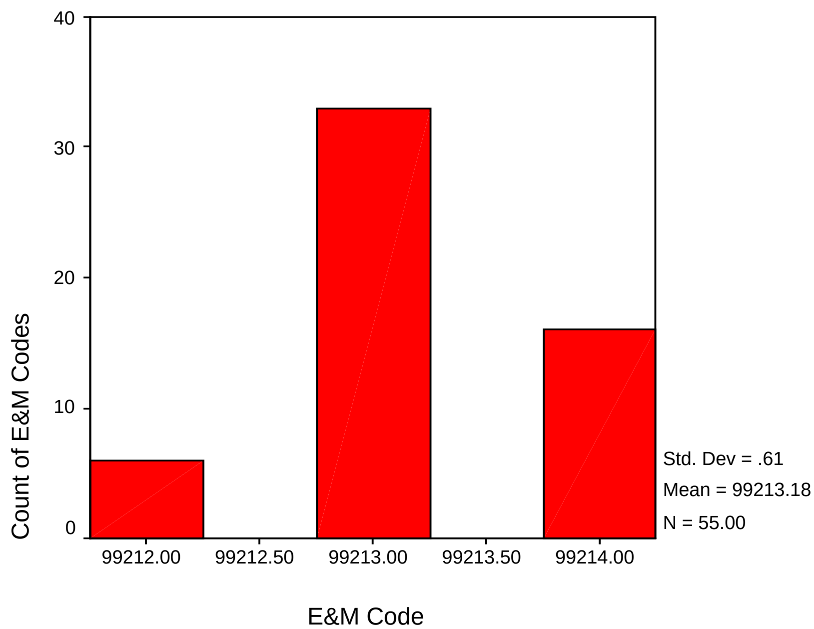


Figure B3. **Certified Coder Diagnoses Coding for Provider Data Set**

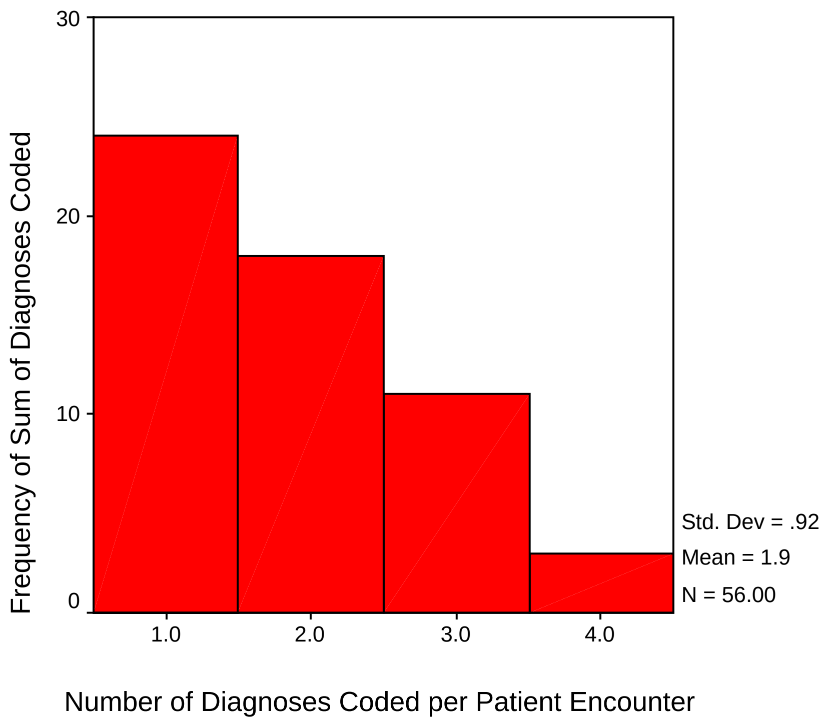


Figure B4. **Home-Grown Coder Diagnoses Coding**

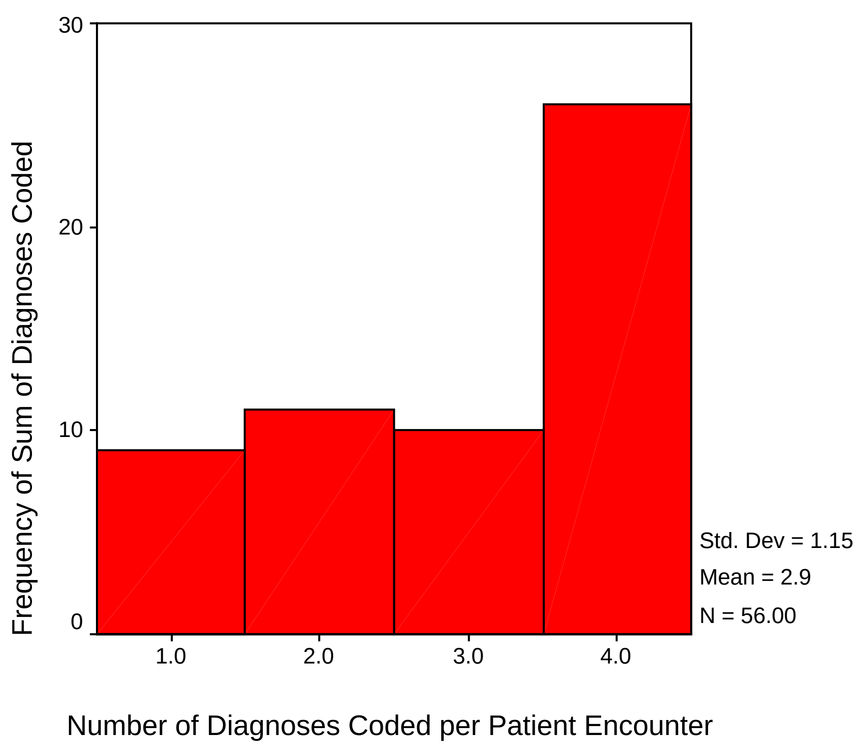


Figure B5. **Certified Coder Procedure Coding for Provider Data Set**

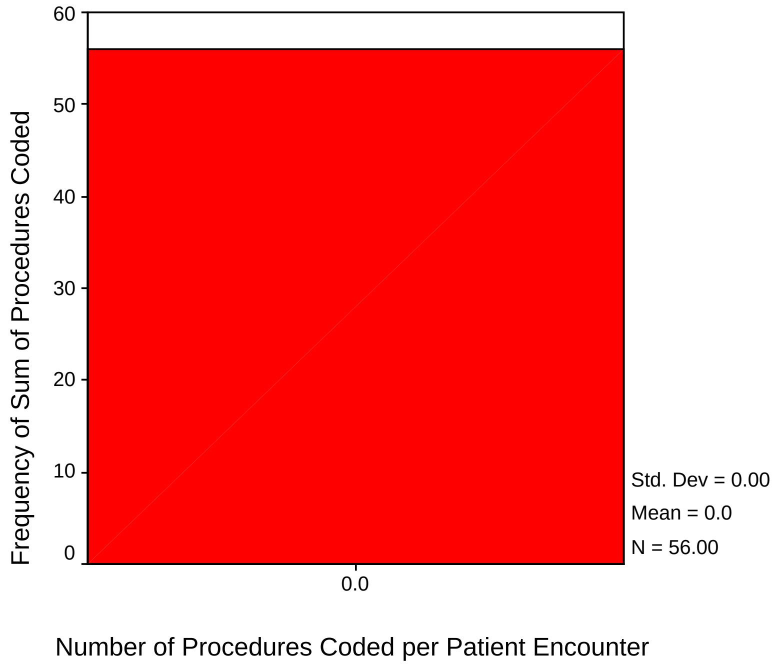
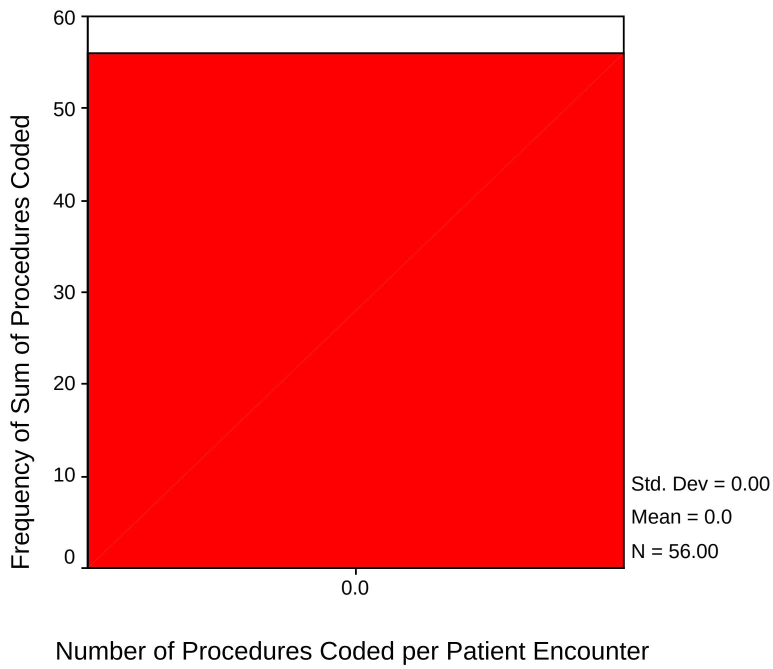


Figure B6**. Home-Grown Coder Procedure Coding**



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